

URBAN WASTE HEAT RECOVERY

STUDYING THE POTENTIAL FOR WASTE HEAT RECOVERY WITH A VIEW TOWARDS THE OVERALL EFFICIENCY OF THE URBAN SYSTEM: THE RECOV'HEAT TOOL

What is waste heat? Waste heat is the heat generated by a process which creates heat without it being the purpose of that process. This energy is lost, with potential disruptive impacts on the environment, unless recovered or recycled. Why is it important to recover waste heat? Recover waste heat from urban buildings as water treatment plant (also called sewage), data centers, stations, urban factories, shopping centers, is a way to increase the value of the energetic urban mix and to allow cities to become leaders in the energetic transition.

Saisissez les surfaces de la zone d'étude

BUREAUX (m²) :	20000
LOGEMENTS (m²) :	30000
MAISONS INDIVIDUELLES (m²) :	10000
ECOLES (m²) :	4000
COMMERCES (m²) :	3000
CRECHES (m²) :	1000
Surface totale (m²) :	98000

Sélectionnez le type de source (*) :

☒ Eaux-usées ☐ Data Center ☐ Blanchiseries ☐ Verretries ☐ Biscuiteries ☐ UIOM

Paramétrez les données de production & distribution

Température d'usage (°) : Moyenne température (55-65°C)

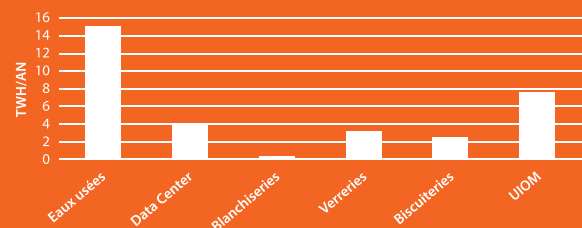
Usages du chaud : ☒ Chauffage ☒ ECS

Distance source - réseau (m) (*) : 500

Eaux-usées

Indiquez le nombre équivalent d'habitants connectés au collecteur ou à la STEP (*) : 7500

Maximum potential on a national scale *



* This production estimation is more important than what it could be possible to recover from the different waste heat sources. Once the geographical configuration, the operating, economical and juridical constraints are taken into consideration, this estimation will decrease significantly.

► The RECOV'HEAT tool provides a quick estimation of a waste heat source, with a view towards the overall efficiency of the district. It compares heat sources to the energetic needs, and determines whether it is pertinent to exploit the waste heat source. What sources? Waste water, data centers, incineration plants, biscuit factory, glasswork factory.

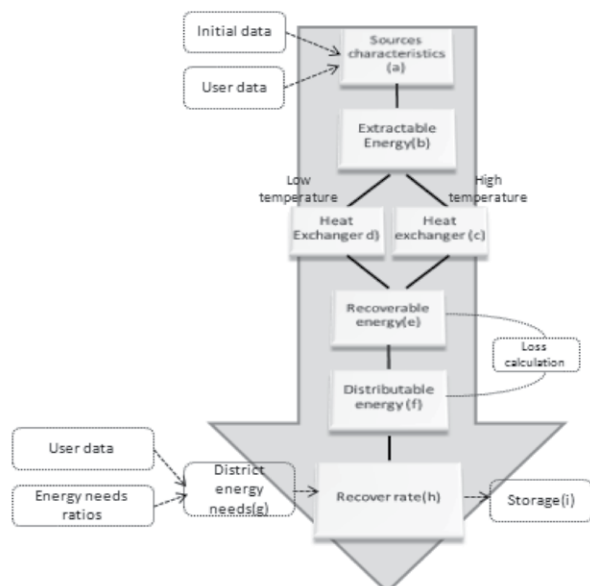
TO WHOM IS IT ADRESSED

- Energy and urban network operators
- Territorial collectivities: elected representatives and technical services
- Citizens, associations
- Waste heat producers: industrials, service companies, etc.

METHOD

► Each source has a proper algorithm. It uses at least one data asked to the user and physical properties of the selected source. For example, starting points of heat recovery potential calculation from a sewage network are the flow, the temperature and the water heat of combustion value.

► The diagram sums up the method developed, which is the same for all algorithms: it evaluates step by step the extractable energy, the recoverable energy after the use of extracting technologies, the distributable energy after heat loss calculation and finally, the monthly recover rate, according to thermal needs of a district, sized by the user.



Recov'Heat algorithm

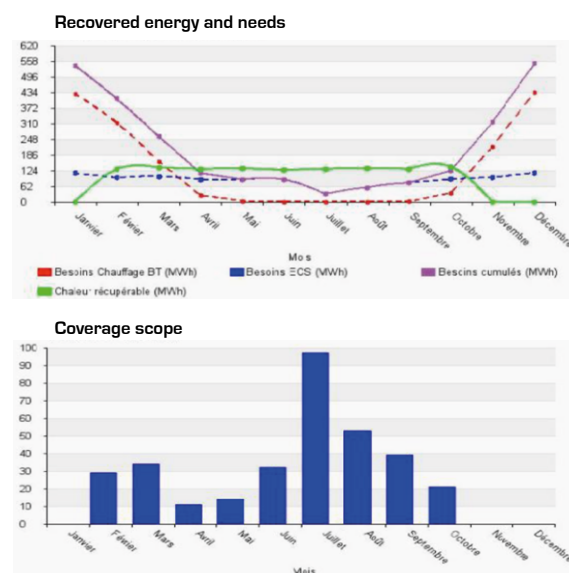
RESULTS

/// Simulation results

- The annual energetic assessment sums up:
 - the yearly distributable energy quantity (MWh);
 - the yearly recover rate according to district needs;
 - the recovery conditions according to the studied source (compatibility with use temperatures...).

/// Model validation

- Real data from already existing waste heat recovery projects (waste incinerator, datacenter, sewage)
- The absolute difference is quite low. Recov'Heat calculate a maximal potential (MWh) without any constraint. It is often higher than real projects.



Simulation example with heat recovery potential on sewage

PERSPECTIVES

/// The first version of Recov'Heat gives a quick energy potential of a waste heat source, during a year with a monthly detail.

/// The next version of the tool, in developing process, would propose more detailed calculation (hourly stages), geographic information system (GIS) to localize and evaluate more precisely sources, and economic assessments in order to appraise the heat recovery relevance.

- Sewage from 100 inhabitants could be used as heat for about 10 inhabitants.
- 100% of electricity consumption of data-center servers is dissipated in heating form.